BULLETIN
of the
Chicago Herpetological Society

Volume 49, Number 6
June 2014

BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY
Volume 49, Number 6
June 2014

Notes on Reproduction in Mountain Short-horned Lizards, *Phrynosoma hernandesi* (Squamata: Phrynosomatidae), from New Mexico . . . . . Stephen R. Goldberg 77

The Subspecies of Amphibians and Reptiles of the State of Durango, Mexico . . . . . Rosaura Valdez-Lares and Héctor Gadsden 80

What You Missed at the May Meeting . . . . . John Archer 86

Herpetology 2014 89

Unofficial Minutes of the CHS Board Meeting, May 16, 2014 91

Advertisements 92

Cover: Short-horned lizard, *Phrynosoma hernandesi*, from the Galiuro Mountains, Graham County, Arizona. Photograph by Mike Dloogatch.

STAFF

Editor: Michael A. Dloogatch—madadder0@aol.com
Advertising Manager: Ralph Shepstone

2014 CHS Board of Directors

John Archer, President
Jason Hood, Vice-President
Andy Malawy, Treasurer
Jenny Vollman, Recording Secretary
Erica Mede, Corresponding Secretary
Aaron LaForge, Publications Secretary
Mike Dloogatch, Membership Secretary
Dick Buchholz, Sergeant-at-arms
Nancy Kloskowski, Member-at-large
Rich Lamszus, Member-at-large
Teresa Savino, Member-at-large
Mike Scott, Member-at-large

The Chicago Herpetological Society is a nonprofit organization incorporated under the laws of the state of Illinois. Its purposes are education, conservation and the advancement of herpetology. Meetings are announced in this publication, and are normally held at 7:30 P.M., the last Wednesday of each month.

Membership in the CHS includes a subscription to the monthly *Bulletin*. Annual dues are: Individual Membership, $25.00; Family Membership, $28.00; Sustaining Membership, $50.00; Contributing Membership, $100.00; Institutional Membership, $38.00. Remittance must be made in U.S. funds. Subscribers outside the U.S. must add $12.00 for postage. Send membership dues or address changes to: Chicago Herpetological Society, Membership Secretary, 2430 N. Cannon Drive, Chicago, IL 60614.

Manuscripts published in the *Bulletin of the Chicago Herpetological Society* are not peer reviewed. Manuscripts should be submitted, if possible, on IBM PC-compatible or Macintosh format diskettes. Alternatively, manuscripts may be submitted in duplicate, typewritten and double spaced. Manuscripts and letters concerning editorial business should be sent to: Chicago Herpetological Society, Publications Secretary, 2430 N. Cannon Drive, Chicago, IL 60614. **Back issues** are limited but are available from the Publications Secretary for $2.50 per issue postpaid.
Visit the CHS home page at <http://www.Chicagoherp.org>.

The *Bulletin of the Chicago Herpetological Society* (ISSN 0009-3564) is published monthly by the Chicago Herpetological Society, 2430 N. Cannon Drive, Chicago IL 60614. Periodicals postage paid at Chicago IL. **Postmaster:** Send address changes to: Chicago Herpetological Society, Membership Secretary, 2430 N. Cannon Drive, Chicago IL 60614.

Copyright © 2014

Bull. Chicago Herp. Soc. 49(6):77-79, 2014

Notes on Reproduction in Mountain Short-horned Lizards, *Phrynosoma hernandesi* (Squamata: Phrynosomatidae), from New Mexico

Stephen R. Goldberg
Biology Department, Whittier College
PO Box 634
Whittier, CA 90608
sgoldberg@whittier.edu

Abstract

A histological examination of gonadal material from viviparous mountain short-horned lizards, *Phrynosoma hernandesi*, from New Mexico was conducted. Spermiogenesis commences in April and ends in May. The smallest reproductively active male (spermiogenesis) measured 74 mm SVL. Based on females from July with ovaries containing corpora lutea and with empty oviducts, neonates of *P. hernandesi* are born commencing in July. Mean litter size for 14 gravid *P. hernandesi* females was 16.0 ± 4.6 SD, range = 9–26. Linear regression analysis revealed a significant positive correlation between female body size and egg number. The smallest reproductively active female (oviductal eggs) measured 69 mm SVL.

Mountain short-horned lizards, *Phrynosoma hernandesi* Girard, 1858 range from southern Alberta and Saskatchewan, Canada through the western United States and into northeastern Sonora, Chihuahua, and Durango, Mexico; they are viviparous (Hodges, 2009). The most complete information on *P. hernandesi* (as *P. douglassi*) reproduction is in Goldberg (1971) and Howard (1974). Anecdotal information on the reproduction of *P. hernandesi* is in Smith (1946); Stebbins (1954, 2003); Behler and King (1979); Williamson et al. (1994); Hammerson (1999); Russell and Bauer (2000); Werner et al. (2004); Brennan and Holycross (2006); Kiesow (2006); Hodges (2009); Fogell (2010); Lewis (2011); other anecdotal accounts on *P. hernandesi* reproduction are in Degenhardt et al. (1996). The purpose of this note is to provide the first information on the reproductive cycle of *P. hernandesi* from New Mexico.

Methods

A sample of 40 *P. hernandesi* consisting of 10 adult males, (mean snout–vent length, SVL = 73.2 mm ± 5.6 SD, range = 65–80 mm); 28 adult females, (mean SVL = 80.5 mm ± 9.6 SD, range = 66–95 mm), and 2 subadults (mean SVL = 60.0 mm ± 2.8 SD, range = 58–62 mm) was examined from the herpetology collection of the Museum of Southwestern Biology (MSB), University of New Mexico, Albuquerque, New Mexico, USA. *Phrynosoma hernandesi* were collected 1961 to 1980. Specimens are listed by New Mexico County in the appendix.

A small incision was made in the lower part of the abdomen and the left gonad was removed for histological examination. Gonads were embedded in paraffin and sections were cut at 5 µm and stained with Harris hematoxylin followed by eosin counterstain (Presnell and Schreibman, 1997). Histology slides were deposited in MSB. Enlarged ovarian follicles (> 5 mm length) or oviductal eggs were counted. An unpaired *t*-test was used to test for differences between male and female SVLs and the relation between female body size (SVL) and litter size was examined by linear regression analysis using Instat 3 (Graphpad, San Diego, CA).

Results

Monthly stages in the testicular cycle are in Table 1. Three stages of the testicular cycle were present: (1) regressed, seminiferous tubules are at their smallest sizes and contain spermatogonia and interspersed Sertoli cells; (2) recrudescence, a proliferation of germ cells occurs for the next period of spermiogenesis, and is evidenced by the presence of spermatogonia, primary and occasional secondary spermatocytes; (3) spermiogenesis, lumina of the seminiferous tubules are lined by sperm or clusters of metamorphosing spermatids, The smallest reproductively active male (spermiogenesis) measured 74 mm SVL (MSB 19335) and was collected in May. The period of spermiogenesis was brief and consisted of April and part of May. Regressed testes were observed in May, July and August (Table 1). Recrudescence (renewal of the germinal epitheium) commenced in August and was also recorded from October.

The mean body size (SVL) of my female sample was significantly larger than the mean (SVL) of my male sample (unpaired *t*-test, $t = 2.14$, $df = 35$, $P = 0.0395$). Monthly stages in the ovarian cycle are in Table 2. Four stages were present: (1) quiescent, no yolk deposition in progress; (2) early yolk deposition, basophilic yolk granules in the ooplasm; (3) enlarged ovarian follicles (> 5 mm); (4) oviductal eggs or embryos. There were corpora lutea, but no oviductal eggs or embryos in two July females, indicating young were already born. Mean clutch size for fourteen gravid females was 16.0 ± 4.6 SD, range = 9-26. This is identical to the value of 16 (mean litter size)

Table 1. Monthly stages in the testis cycle of 10 adult *P. hernandesi* from New Mexico.

Month	N	Regressed	Recrudescence	Spermiogenesis
April	4	0	0	4
May	2	1	0	1
July	1	1	0	0
August	2	1	1	0
October	1	0	1	0

Table 2. Monthly stages in the ovarian cycle of 29 adult *P. hernandesi* from New Mexico; a = eggs squashed, could not count clutch; b = corpora lutea, indicating ovulation already occurred; c = embryos present.

Month	N	Quiescent	Early yolk deposition	Enlarged follicles > 5 mm	Oviductal eggs
April	6	0	1	2	3 [a]
May	7	2	0	3	2
June	1	0	0	0	1
July	8	6 [b, b]	0	0	2
August	5	4	0	0	1 [c]
September	2	2	0	0	0

reported for *P. hernandesi* by Hodges (2009), although Brennan and Holycross (2009) reported a litter of 48 young for this species. Linear regression analysis revealed a significant positive correlation between female body size (SVL) and clutch size (N = 14); Y = -17.19 + 0.39X, r = 0.730, $P = 0.003$. The smallest reproductively active female measured 69 mm SVL (MSB 30660), contained oviductal eggs and was collected in June. I arbitrarily considered a few slightly smaller *P. hernandesi* females as adults (SVL = 66, 66, 67). Whereas, two smaller females (SVL 58, 62) from July and May, contained quiescent ovaries and were considered to be subadults.

Discussion

No March *P. hernandesi* from New Mexico were examined, however Goldberg (1971) found spermiogenesis in progress in a *P. hernandesi* (as *P. douglassi*) collected 17 March in the Santa Catalina Mountains, at 2286 m, Pima County, Arizona. The period of spermiogenesis of *P. hernandesi* is of shorter duration than for other North American *Phrynosoma*, as regression commences in May (Table 1). Goldberg (1971) similarly found testicular regression was completed in May in *P. hernandesi* (as *P. douglassi*) from Arizona.

Based on the occurrence of July females (Table 2) with corpora lutea but no embryos, it appears *P. hernandesi* neonates first appear in July. This agrees with Howard (1974) who proposed parturition in *P. hernandesi* (as *P. douglassi*) at low elevations occurred in mid-July which would necessitate late winter, early spring breeding. Goldberg (1971) reported young *P. hernandesi* (as *P. douglassi*) were born in late July to early August in Arizona.

This contrasts with other oviparous *Phrynosoma* in which spermiogenesis continues into summer with the possibility of multiple clutches being produced (*P. mcalli* Goldberg, 2011; *P. modestum*, Goldberg, 2012a; *P. platyrhinos* Howard, 1974; Fitch, 1985; Stebbins, 2003; Brennan and Holycross, 2009; Goldberg, 2012b).

Acknowledgments

I thank H. Snell (MSB) for permission to examine *P. hernandesi* and J. Giermakowski (MSB) for facilitating the loan.

Literature Cited

Behler, J. C., and F. W. King. 1979. The Audubon Society field guide to North American reptiles and amphibians. New York: Alfred A. Knopf.

Brennan, T. C., and A. T. Holycross. 2009. A field guide to amphibians and reptiles in Arizona. Phoenix: Arizona Game and Fish Department.

Degenhardt, W. G., C. W. Painter and A. H. Price. 1996. Amphibians and reptiles of New Mexico. Albuquerque: University of New Mexico Press.

Fitch, H. S. 1985. Variation in clutch and litter size in New World reptiles. University of Kansas, Museum of Natural History, Miscellaneous Publication 76:1-76.

Fogell, D. D. 2010. A field guide to the amphibians and reptiles of Nebraska. Lincoln: University of Nebraska.

Goldberg, S. R. 1971. Reproduction in the short-horned lizard *Phrynosoma douglassi* in Arizona. Herpetologica 27(3):311-314.

————. 2011. Notes on reproduction of the flat-tailed horned lizard, *Phrynosoma mcallii* (Squamata: Phrynosomatidae). Bull. Chicago Herp. Soc. 46(3):30-31.

————. 2012a. Notes on reproduction in roundtail horned lizards, *Phrynosoma modestum* (Squamata: Phrynosomatidae) from New Mexico. Bull. Chicago Herp. Soc. 47(3):34-36.

————. 2012b. Notes on reproduction of desert horned lizards, *Phrynosoma platyrhinos* (Squamata: Phrynosomatidae) from southern California. Bull. Chicago Herp. Soc. 47(7):89-91.

Hammerson, G. A. 1999. Amphibians and reptiles in Colorado, second edition. Boulder: University Press of Colorado.

Hodges, W. L. 2009. Greater-short horned lizard *Phrynosoma hernandesi* Girard, 1858. Pp. 178-181. *In*: L. L. C Jones and R. E. Lovich, editors, Lizards of the American Southwest: A photographic field guide. Tucson, Arizona: Rio Nuevo Publishers.

Howard, C. W. 1974. Comparative reproductive ecology of horned lizards (Genus *Phrynosoma*) in southwestern United States and northern Mexico. Journal of the Arizona Academy of Science 9(3):108-116.

Kiesow, A. M. 2006. Field guide to amphibians and reptiles of South Dakota. Pierre, South Dakota: Department of Game, Fish and Parks.

Lewis, D. 2011. A field guide to the amphibians and reptiles of Wyoming. Douglas, Wyoming: The Wyoming Naturalist.

Presnell, J. K., and M. P. Schreibman. 1997. Humason's animal tissue techniques, 5th edit. Baltimore: The Johns Hopkins University Press.

Russell, A. P., and A. M. Bauer. 2000. The amphibians and reptiles of Alberta, A field guide and primer of boreal herpetology. 2nd Edit., Calgary: University of Calgary Press.

Smith, H. R. 1946. Handbook of lizards: Lizards of the United States and of Canada. Ithaca, New York: Comstock Publishing Associates.

Stebbins, R. C. 1954. Amphibians and reptiles of western North America. New York: McGraw-Hill Book Company.

————. 2003. A field guide to western reptiles and amphibians. New York: McGraw-Hill Book Company.

Werner, J. K., B. A. Maxell, P. Hendricks and D. L. Flath. 2004. Amphibians and reptiles of Montana. Missoula, Montana: Mountain Press Publishing Company.

Williamson, M. A., P. W. Hyder and J. S. Applegarth. 1994. Snakes, lizards, turtles, frogs, toads, and salamanders of New Mexico: A field guide. Santa Fe, New Mexico: Sunstone Press.

Appendix

Phrynosoma hernandesi from New Mexico (MSB) examined by county: **Bernalillo**: MSB 10560, 10929, 11287, 11464, 11501, 14435, 16878, 19335, 19336, 19987, 22379, 26048, 26139, 52903; **Catron**: MSB 6375, 10210, 26401; **Colfax**: MSB 5265, 40327, 40353; **Hidalgo**: MSB 13626, 32295; **Lincoln**: MSB 22489, 22490; **McKinley**: MSB 3238; **Sandoval**: MSB 26393, 30660; **Santa Fe**: MSB 4334, 17702, 36919; **San Juan**: MSB 3195; **Socorro**: MSB 8618; **Torrance**: MSB 6865, 6868, 10248, 26325, 26362, 32086; **Valencia**: 23096, 23285.

Bull. Chicago Herp. Soc. 49(6):80-85, 2014

The Subspecies of Amphibians and Reptiles of the State of Durango, Mexico

Rosaura Valdez-Lares [1] and Héctor Gadsden [2]

To complement the recently published checklist of amphibians and reptiles of the state of Durango, Mexico (Valdez-Lares et al., 2013), we obtained more detailed information from the literature regarding the infraspecific taxonomic level of subspecies.

The validity, use and misuse of subspecies has been discussed in many fields for decades and the debate on whether or not they should be used continues (Starrett, 1958; Mallet, 2007) without consensus on their appropriateness. The use of subspecies has found greatest support in conservation biology (Mallet, 2007). In this field, subspecies can be seen as more specific targets to canalize efforts and resources for management and conservation purposes (Agapow et al., 2004; Gamauf et al., 2005; Haig et al., 2006).

With recent advances in molecular biology and biosystematics and the development of new methods for delimiting species (Fujita et al., 2012; Carstens et al., 2013), there is a trend to reevaluate the current classification of organisms, using in many cases a phylogenetic approach, to reassess their taxonomic situation. The evaluation can then result in the invalidity of certain subspecies or, in some cases, in their recognition as separate species (Mallet, 2006).

The subspecies role has been deeply discussed in mammal and avian taxonomy (e.g., Zink, 2004; Crifasi, 2007; Gippoliti and Amori, 2007, Hey, 2010; James, 2010; Patten, 2010). Less discussion has been given in herpetology (Frost and Hillis, 1990; Johnson et al., 2010; Hawlitschek et al., 2012), although the apparent trend is to discontinue the use of subspecies in recent publications. However, some major sources of taxonomic information on the Internet, like lists from the Society for the study of Amphibians and Reptiles (SSAR) (Crother, 2012) and the reptile-database list (Uetz and Hosek, 2014), consider and include subspecies. In Mexico, some of the more recent and detailed accounts of the herpetofauna in the country and in some particular regions, take into account subspecies (Lemos-Espinal and Smith, 2007a, 2007b; Liner, 2007).

Despite questions about the validity of subspecies, new subspecies are still being described (McCord et al., 2010; Hawlitschek et al., 2012), and many current subspecies lack recent or proper studies that assess their taxonomic situation. Therefore, our aim in developing this list without taking part in the discussion on the validity of subspecies is to provide a brief general overview on the current taxonomic situation of subspecies in Durango, and to highlight potential areas for research that may lead to better knowledge of the diversity of amphibians and reptiles in this state. This work is relevant because herpetofauna populations in Durango have had little attention in recent systematic studies and thus there are many questions about the taxonomic situation of many of the subspecies present.

According to the two websites mentioned above, among the 33 amphibian species listed by Valdez-Lares et al. (2013), five (15.15%) have currently recognized subspecies (Table 1), whereas 63 (53.38%) of the 118 reptile species listed have recognized subspecies (Table 2).

Amphibians

Frost's website (Frost, 2014), the most complete account of amphibian species, treats all subspecies as synonyms of their covering species; however, comments and updates about subspecies are covered.

Two species of the genus *Anaxyrus* have subspecific associated taxa (Table 1). Frost (2014) suggests that the subspecies of *A. debilis* are unlikely to be anything other than arbitrarily defined sections of clines and that *A. woodhousii australis* may be a distinct species as evidenced by Masta et al. (2002).

Craugastor augusti cactorum and *C. a. latrans* have been suggested to be two different species (Goldberg et al., 2004), but a formal taxonomic change is pending on the evaluation of populations through central Mexico (Frost, 2014). Two records of this species in central Durango were considered similar to another subspecies, *C. a. augusti*, but not assigned with certainty to any subspecies, suggesting that the recognition of an additional taxon may even be necessary (Zweifel, 1967).

Ambystoma rosaceum may be composed of two allopatric populations (Shaffer, 1983) that Shaffer and McKnight (1996) suggested as distinct species, of which the southern population (Durango/Zacatecas) would be *A. nigrum* and the northern

Table 1. Amphibian species in Durango, Mexico, with valid subspecies.

Family	**Subspecies in Durango**
Bufonidae	*Anaxyrus debilis insidior* (Girard, 1854)
	Anaxyrus woodhousii australis (Shannon and Lowe, 1955)
Craugastoridae	*Craugastor augusti cactorum* (Taylor, 1939)
Eleutherodactylidae	*Eleutherodactylus nitidus petersi* (Duellman, 1954)
Ambystomatidae	*Ambystoma rosaceum nigrum* Shannon, 1951

1. E-mail: biorosaura@gmail.com

2. Corresponding author. Instituto de Ecología, A. C., Miguel de Cervantes 120, Complejo Industrial Chihuahua, C. P. 31109. Chihuahua, Chih., México. E-mail: hector.gadsden@inecol.mx

(Sonora/Chihuahua) *A. rosaceum* (Frost, 2014). Specimens of *A. rosaceum* unassigned to subspecies, were recorded by Webb and Baker (1984) in the municipality of Tamazula, close to the limit with the state of Chihuahua, where Lemos-Espinal and Smith (2007a) consider all the populations as *A. rosaceum rosaceum*. Therefore, populations from extreme northwest Durango may correspond to *A. r. rosaceum*, but at present there are no other records to corroborate the presence of this taxon.

Reptiles

The current taxonomic situation of the subspecies *Trachemys gaigeae hartwegi*, *Barisia imbricata ciliaris* and *Gerrhonotus liocephalus taylori* are briefly mentioned in Valdez-Lares et al. (2013) and therefore, not repeated here. The subspecies of the genus *Crotalus* present in Durango are summarized in Muñiz-Martínez and Valdez-Lares (2012). Despite the mention of *Crotalus lepidus lepidus* and *C. molossus molossus* in that account, they need confirmation and are thus not presented here.

Within the genus *Phrynosoma*, the species *P. hernandesi* is included instead of *P. douglasii*, following Zamudio et al. (1997). However samples of the taxon *brachycercum*, previously known as *P. douglasii brachycercum*, and whose known distribution falls within Durango's highlands, were not included in that study and its status is pending on new evidence. Crother (2012) points out three scenarios for the taxon *brachycercum*: 1) it constitutes a lineage that is related to, but fully separated from *P. hernandesi*, 2) a partially separated lineage within *P. hernandesi*, or 3) an unseparated (artificial) part of the *P. hernandesi* lineage. Within *P. orbiculare*, the subspecies *durangoensis* is not generally recognized as a valid taxon. However, Bryson (2011) confirmed that some mitochondrial lineages, among them *P. o. durangoensis*, are consistent with the subspecies division made by Horowitz (1955) based on morphological characters, as a separate lineage from *P. o. bradti* from Chihuahua.

One of the groups with taxonomic and systematic issues that need addressing is the *Sceloporus grammicus* complex (Crother, 2012). Populations in Durango are often referred to as *S. g. disparilis*, and therefore we include this one in the list. The identity of some populations in Durango of *S. poinsettii* also needs to be addressed. The two subspecies certain to occur in Durango are *S. p. amydrus* in the southeast, and *S. p. macrolepis* in the western portion (Webb, 2008). In the rest of the state, populations are considered as intermediate variants sharing morphological characteristics between these two subspecies, but also with *S. p. poinsettii* and *S. p. polylepis* (Webb, 2006). These last two subspecies are present in the neighboring states of Chihuahua and Coahuila (Lemos-Espinal and Smith, 2007a, 2007b).

Some other individuals with intermediate characteristics between subspecies have been reported from Durango. The only record of *Geophis dugesii* in the state was considered to be an intergrade between subspecies *G. d. dugesii* and *G. d. aquilonaris* (Webb, 1977). For the species *Diadophis punctatus*, scattered records exist referring to subspecies *D. p. dugesii* (Gadsden et al., 2006), *D. p. regalis* or integrades between the two subspecies (Gehlbach, 1965). In both cases (*G. dugesii* and *D. punctatus*), considering the known distribution of their respective subspecies, it is probable that all subspecies mentioned are present in Durango, but further information is required.

Some subspecies, like *Uta stansburiana stejnegeri* and *Boa constrictor imperator* have been suggested to merit species status (Hynková et al., 2009; Upton and Murphy, 1997). However, at the moment are still considered subspecies awaiting further studies to support the modifications. *Thamnophis rufipunctatus unilabialis*, recently studied by Wood et al. (2011), is not considered a valid subspecies and is placed in synonymy with *T. rufipunctatus* in Crother (2012) and Uetz and Hosek (2014).

In some of the recent records for the state, subspecies have been omitted as a format requisite. This is the case of *Drymarchon melanurus rubidus* (Muñiz-Martínez and Valdez-Lares, 2011), *Leptodeira splendida eppiphiata* and *Leptophis diplotropis diplotropis* (Valdez-Lares and Muñiz-Martínez, 2011a, 2011b), identified to subspecific level by the authors. Also the record of *Heloderma horridum* in northwest Durango (Ahumada-Carrillo et al., 2011) was determined as the subspecies *exasperatum* (Ivan Ahumada-Carrillo, pers. comm.).

Other subspecies previously known to occur in Durango such as *Nerodia erythogaster bogerti* and *Rhinocheilus lecontei tessellatus*, have been reevaluated and found as invalid taxa and synonymized within the species (Makowsky et al., 2010; Manier, 2004). Also, the subspecies *Lampropeltis getula splendida* has been revalidated to species status as *L. splendida* (Pyron and Burbrink, 2009), as should be listed in Valdez-Lares et al. (2013). For the rest of the subspecies of reptiles in the state, there is no recent information on the matter. The following corrections to our species checklist (Valdez-Lares et al., 2013) are made to match the valid species names in the reptile database (Uetz and Hosek, 2014): *Holbrookia maculata* instead of *H. approximans*, *Thamnophis valida* instead of *T. validus*, *Thamnophis elegans* instead of *T. errans*, *Sceloporus undulatus* instead of *S. edbelli*, *Rena humilis* instead of *Leptotyphlops humilis*, and *Anolis nebulosus* instead of *Norops nebulosus*.

The taxonomic rank of subspecies remains highly contentious, largely because traditional subspecies boundaries have sometimes been contradicted by molecular phylogenetic data. However, the broader picture is that subspecies of amphibians and reptiles often provide an effective shortcut for estimating patterns of intraspecific genetic diversity, thereby providing a useful tool for the study of evolutionary divergence and conservation. Subspecies may be of considerable conservation utility, as proxies for the substructure found within species, especially where molecular data are absent or the species lack recent evaluation.

As we stated above, our purpose is to provide a broad overview of the subspecies reported to be present in the state. Durango, by its physiographic and climatic characteristics, is an area where many subspecies converge and can be a key zone for future research on the systematics of some species of herpetofauna.

Acknowledgments

We are grateful to all the colleagues who collaborated to put the list of species together, Raúl Muñíz, Gustavo Aguirre, Gamaliel Castañeda and Rolando González. Also to Gerardo Martín and Benjamin Scheele for their comments and improvements to the present manuscript.

Table 2. Reptile species in Durango, Mexico, with valid subspecies.

Family	**Subspecies in Durango**
Emydidae	*Trachemys gaigeae hartwegi* (Legler, 1990)
Kinosternidae	*Kinosternon hirtipes murrayi* Glass and Hartweg, 1951
Anguidae	*Barisia imbricata ciliaris* (Smith, 1942) *Elgaria kingii ferruginea* Webb, 1962 *Gerrhonotus liocephalus taylori* Tihen, 1954
Crotaphytidae	*Crotaphytus collaris melanomaculatus* Axtell and Webb, 1995 *Gambelia wislizenii wislizenii* Baird and Girard, 1852
Gekkonidae	*Phyllodactylus tuberculosus saxatilis* Dixon, 1964
Helodermatidae	*Heloderma horridum exasperatum* Bogert and Martín del Campo, 1956 *Heloderma horridum horridum* (Wiegmann, 1829)
Phrynosomatidae	*Cophosaurus texanus scitulus* (Peters, 1951) *Holbrookia maculata approximans* Baird, 1858 *Phrynosoma hernandesi brachycercum* Smith, 1942 *Phrynosoma orbiculare bradti* Horowitz, 1955 *Sceloporus clarkii boulengeri* Stejneger, 1893 *Sceloporus grammicus disparilis* Stejneger, 1916 *Sceloporus horridus oligoporus* Cope, 1864 *Sceloporus merriami ballingeri* Lemos-Espinal, Smith, Auth and Chiszar, 2001 *Sceloporus nelsoni nelsoni* Cochran, 1923 *Sceloporus poinsettii amydrus* Webb, 2006 *Sceloporus poinsettii macrolepis* Smith and Chrapliwy, 1958 *Sceloporus scalaris brownorum* Smith, Watkins-Colwell, Lemos-Espinal and Chiszar, 1997 *Sceloporus scalaris unicanthalis* Smith, 1937 *Sceloporus spinosus spinosus* Wiegmann, 1828 *Sceloporus torquatus melanogaster* Cope, 1885 *Sceloporus undulatus edbelli* Smith, Chiszar and Lemos-Espinal, 1995 *Urosaurus bicarinatus tuberculatus* (Schmidt, 1921) *Urosaurus ornatus caeruleus* (Smith, 1935) *Uta stansburiana stejnegeri* Schmidt, 1921
Scincidae	*Plestiodon lynxe bellii* (Gray, 1845)
Teiidae	*Aspidoscelis costata huico* (Zweifel, 1959) *Aspidoscelis gularis semiannulatus* (Walker, 1967) *Aspidoscelis inornata chihuahuae* (Wright and Lowe, 1993) *Aspidoscelis inornata heptagramma* (Axtell, 1961) *Aspidoscelis inornata paulula* (Williams, 1968) *Aspidoscelis marmorata marmorata* (Baird and Girard, 1852) *Aspidoscelis marmorata pulcher* (Williams, Smith and Chrapliwy, 1960)
Boidae	*Boa constrictor imperator* Daudin, 1803
Colubridae	*Arizona elegans expolita* Klauber, 1946 *Bogertophis subocularis amplinotus* Webb, 1990

Table 2 (cont'd).

Family	Subspecies in Durango
Colubridae	*Coluber flagellum lineatulus* (Smith, 1941)
	Coluber mentovarius striolatus (Mertens, 1934)
	Coluber taeniatus girardi Stejneger and Barbour, 1917
	Conopsis nasus nasus Günther, 1858
	Diadophis punctatus dugesii Villada, 1875
	Drymarchon melanurus rubidus Smith, 1941
	Geophis dugesii dugesii Bocourt, 1883
	Hypsiglena jani texana Stejneger, 1893
	Hypsiglena torquata torquata (Günther, 1860)
	Lampropeltis mexicana greeri Webb, 1961
	Leptodeira splendida ephippiata Smith and Tanner, 1944
	Leptophis diplotropis diplotropis (Günther, 1872)
	Pituophis catenifer affinis (Hallowell, 1852)
	Pituophis deppei deppei (Duméril, 1853)
	Salvadora grahamiae lineata Schmidt, 1940
	Senticolis triaspis intermedia (Boettger, 1883)
	Sonora semiannulata semiannulata Baird and Girard, 1853
	Thamnophis cyrtopsis collaris (Jan, 1863)
	Thamnophis cyrtopsis cyrtopsis (Kennicott, 1860)
	Thamnophis eques megalops (Kennicott, 1860)
	Thamnophis eques virgatenuis Conant, 1963
	Thamnophis elegans errans Smith, 1942
	Thamnophis marcianus marcianus (Baird and Girard, 1853)
	Thamnophis melanogaster canescens Smith, 1942
	Thamnophis melanogaster chihuahuaensis Tanner, 1959
	Trimorphodon tau tau Cope, 1870
Leptotyphlopidae	*Rena humilis segregus* Klauber, 1939
Viperidae	*Crotalus lepidus klauberi* Gloyd, 1936
	Crotalus lepidus maculosus Tanner, Dixon and Harris, 1972
	Crotalus molossus nigrescens Gloyd, 1936
	Crotalus pricei pricei Van Denburgh, 1895
	Crotalus scutulatus scutulatus (Kennicott, 1861)
	Crotalus willardi meridionalis Klauber, 1949

Literature Cited

Agapow, P.-M., O. R. P. Bininda-Emonds, K. A. Crandall, J. L. Gittleman, G. M. Mace, J. C. Marshall and A. Purvis. 2004. The impact of species concept on biodiversity studies. The Quarterly Review of Biology 79(2):161-179.

Ahumada-Carrillo, I. T., C. A. Hernández-Jimenez and U. O. García-Vázquez. 2011. Geographic distribution: *Heloderma horridum*. Herpetological Review 42(1):111.

Carstens, B. C., T. A. Pelletier, N. M. Reid and J. D. Satler. 2013. How to fail at species delimitation. Molecular Ecology 22(17): 4369-4383.

Crifasi, R. R. 2007. A subspecies no more? A mouse, its unstable taxonomy, and western riparian resource conflict. Cultural Geographies 14(4):511-535.

Crother, B. I. (editor). 2012. Scientific and standard English names of amphibians and reptiles of North America north of Mexico, with comments regarding confidence in our understanding (7th edition). SSAR Herpetological Circular 39.

Frost, D. R. 2014. Amphibian species of the world: An online reference. Version 5.9 (9 January, 2014). Electronic Database accessible at http://research.amnh.org/herpetology/amphibia/index.html. New York: American Museum of Natural History.

Frost, D. R., and D. M. Hillis. 1990. Species in concept and practice: Herpetological applications. Herpetologica 46(1):87-104.

Fujita, M. K., A. D. Leaché, F. T. Burbrink, J. A. McGuire and C. Moritz. 2012. Coalescent-based species delimitation in an integrative taxonomy. Trends in Ecology and Evolution 27(9):480-488.

Gadsden, H., J. L. Estrada-Rodríguez and S. V. Leyva-Pacheco. 2006. Checklist of amphibians and reptiles of the Comarca Lagunera in Durango-Coahuila, Mexico. Bull. Chicago Herp. Soc. 41(1):2-9.

Gamauf, A., J.-O. Gjershaug, N. Røv, K. Kvaløy and E. Haring. 2005. Species or subspecies? The dilemma of taxonomic ranking of some South-East Asian hawk-eagles (genus *Spizaetus*). Bird Conservation International 15(01):99-117.

Gehlbach, F. R. 1965. Herpetology of the Zuni Mountains region, northwestern New Mexico. Proceedings of the United States National Museum 116(3505):243-332.

Gippoliti, S., and G. Amori. 2007. The problem of subspecies and biased taxonomy in conservation lists: The case of mammals. Folia Zoologica 56(2):113-117.

Goldberg, C. S., B. K. Sullivan, J. H. Malone and C. R. Schwalbe. 2004. Divergence among barking frogs (*Eleutherodactylus augusti*) in the southwestern United States. Herpetologica 60(3):312-320.

Haig, S. M., E. A. Beever, S. M. Chambers, H. M. Draheim, B. D. Dugger, S. Dunham, E. Elliott-Smith, J. B. Fontaine, D. C. Kesler, B. J. Knaus, I. F. Lopes, P. Loschl, T. D. Mullins and L. M. Sheffield. 2006. Taxonomic considerations in listing subspecies under the U.S. Endangered Species Act. Conservation Biology 20(6):1584-1594.

Hawlitschek, O., Z. T. Nagy and F. Glaw. 2012. Island evolution and systematic revision of Comoran snakes: Why and when subspecies still make sense. PloS One 7(8):1-19.

Hey, J. 2010. The divergence of chimpanzee species and subspecies as revealed in multipopulation isolation-with-migration analyses. Molecular Biology and Evolution 27(4):921-933.

Horowitz, S. B. 1955. An arrangement of the subspecies of the horned toad, *Phrynosoma orbiculare* (Iguanidae). American Midland Naturalist 54(1):204-218.

Hynková, I., Z. Starostová and D. Frynta. 2009. Mitochondrial DNA variation reveals recent evolutionary history of main *Boa constrictor* clades. Zoological Science 26(9):623-631.

James, F. C. 2010. Avian subspecies: Introduction. Ornithological Monographs (67):1-5.

Johnson, J. D., L. D. Wilson and J. H. Towsnsend. 2010. Summary of recent changes in higher taxonomic categories of Mesoamerican amphibians and reptiles. Pp. 19-27. *In*: L. D. Wilson, J. H. Townsend, and J. D. Johnson, editors, Conservation of Mesoamerican amphibians and reptiles. Eagle Mountain, Utah: Eagle Mountain Publishing.

Lemos-Espinal, J. A., and H. M. Smith. 2007a. Anfibios y reptiles del estado de Chihuahua, México / Amphibians and reptiles of the state of Chihuahua, Mexico. UNAM-CONABIO (Universidad Nacional Autónoma de México / Comisión Nacional para el Conocimiento y Uso de la Biodiversidad).

Lemos-Espinal, J. A., and H. M. Smith. 2007b. Anfibios y reptiles del estado de Coahuila, México / Amphibians and reptiles of the state of Coahuila, Mexico. UNAM-CONABIO (Universidad Nacional Autónoma de México / Comisión Nacional para el Conocimiento y Uso de la Biodiversidad).

Liner, E. A. 2007 . A checklist of the amphibians and reptiles of México. Occasional Papers of the Louisiana State University Museum of Natural Science (80):1-60.

Makowsky, R., J. C. Marshall, Jr., J. McVay, P. T. Chippindale and L. J. Rissler. 2010. Phylogeographic analysis and environmental niche modeling of the plain-bellied watersnake (*Nerodia erythrogaster*) reveals low levels of genetic and ecological differentiation. Molecular Phylogenetics and Evolution 55(3):985-995.

Mallet, J. 2006. Species concepts. Pp. 367-373. *In*: C. W. Fox and J. B. Wolf, editors, Evolutionary genetics: concepts and case studies. Oxford, England: Oxford University Press.

————. 2007. Subspecies, semispecies, superspecies. Pp. 1-5. *In*: S. A. Levin, editor, Encyclopedia of biodiversity. Oxford, England: Elsevier.

Manier, M. K. 2004. Geographic variation in the long-nosed snake, *Rhinocheilus lecontei* (Colubridae): Beyond the subspecies debate. Biological Journal of the Linnean Society 83(1):65-85.

Masta, S. E., B. K. Sullivan, T. Lamb and E. J. Routman. 2002. Molecular systematics, hybridization, and phylogeography of the *Bufo americanus* complex in eastern North America. Molecular Phylogenetics and Evolution 24(2):302-314.

McCord, W. P., M. Joseph-Ouni, C. Hagen and T. Blanck. 2010. Three new subspecies of *Trachemys venusta* (Testudines: Emydidae) from Honduras, northern Yucatán (Mexico), and Pacific coastal Panama. Reptilia (71):39-49.

Muñiz-Martínez, R., and R. Valdez-Lares. 2011. Geographic distribution: *Drymarchon melanurus*. Herpetological Review 42(3):393.

Muñiz-Martínez, R., and R. Valdez-Lares. 2012. Actualización a los crotálidos de Durango, México. Vertebrata Mexicana (24):1-9.

Patten, M. A. 2010. Null expectations in subspecies diagnosis. Ornithological Monographs (67):35-41.

Pyron, R. A., and F. T. Burbrink. 2009. Systematics of the Common Kingsnake (*Lampropeltis getula*; Serpentes: Colubridae) and the burden of heritage in taxonomy. Zootaxa (2241):22-32.

Shaffer, H. B. 1983. Biosystematics of *Ambystoma rosaceum* and *A . tigrinum* in northwestern Mexico. Copeia 1983(1):67-78.

Shaffer, H. B., and M. L. McKnight. 1996. The polytypic species revisited: Genetic differentiation and molecular phylogenetics of the tiger salamander *Ambystoma tigrinum* (Amphibia: Caudata) complex. Evolution 50(1):417-433.

Starrett, A. 1958. What is the subspecies problem? Systematic Zoology 7(3):111-115.

Uetz, P., and J. Hosek. 2014. The reptile database. Retrieved January, 2014, from http://www.reptile-database.org/

Upton, D. E., and R. W. Murphy. 1997. Phylogeny of the side-blotched lizards (Phrynosomatidae: *Uta*) based on mtDNA sequences: Support for a midpeninsular seaway in Baja California. Molecular Phylogenetics and Evolution 8(1):104-113.

Valdez-Lares, R., and R. Muñiz-Martínez. 2011a. Geographic distribution: *Leptodeira splendida*.. Herpetological Review 42(3):394.

Valdez-Lares, R., and R. Muñiz-Martínez. 2011b. Geographic distribution: *Leptophis diplotropis*.. Herpetological Review 42(3):394.

Valdez-Lares, R., R. Muñiz-Martínez, H. Gadsden, G. Aguirre-León, G. Castañeda-Gaytán, and R. González-Trápaga. 2013. Checklist of amphibians and reptiles of the state of Durango, México. Checklist 9(4):714-724.

Webb, R. G. 1977. Comments on snakes of the genus *Geophis* (Colubridae) from the Mexican states of Durango and Sinaloa. The Southwestern Naturalist 21(4):548-551.

————. 2006. Variation in the Crevice Spiny Lizard, *Sceloporus poinsettii* Baird and Girard . Bull. Maryland Herp. Soc. 42(2):65-114.

————. 2008. *Sceloporus poinsettii*. Catalogue of American Amphibians and Reptiles (856):1-18.

Webb, R. G., and R. H. Baker. 1984. Terrestrial vertebrates of the Cerro Mohinora region, Chihuahua, Mexico. The Southwestern Naturalist 29(2):243-246.

Wood, D. A., A. G. Vandergast, J. A. Lemos-Espinal, R. N. Fisher and A. T. Holycross. 2011. Refugial isolation and divergence in the Narrowheaded Gartersnake species complex (*Thamnophis rufipunctatus*) as revealed by multilocus DNA sequence data. Molecular Ecology 20(18):3856-3878.

Zamudio, K. R., K. B. Jones and R. H. Ward. 1997. Molecular systematics of short-horned lizards: Biogeography and taxonomy of a widespread species complex. Systematic Biology 46(2):284-305.

Zink, R. M. 2004. The role of subspecies in obscuring avian biological diversity and misleading conservation policy. Proceedings of the Royal Society of London, Series B: Biological Sciences 271(1539):561-564.

Zweifel, R. G. 1967. *Eleutherodactylus augusti*. Catalogue of American Amphibians and Reptiles (41):1-4.

Bull. Chicago Herp. Soc. 49(6):86-88, 2014

What You Missed at the May Meeting

John Archer
j-archer@sbcglobal.net

Kristen Wiley and Jim Harrison are two superstars of the venomous snake world. They operate the Kentucky Reptile Zoo (KRZ), keeping thousands of snakes for viewing, but mostly for another purpose. Jim turned his interest in venomous snakes into a nonprofit that is one of the world's leading providers of snake venom. He routinely milks over a hundred snakes a day, every day of the week except for special occasions. Their dedication and kindness is well known and they're both modest about their accomplishments. That's why we were grateful to have them speak at our May meeting. Taking time off from their operation is never easy, but we got a presentation about their "vacation" two years ago. It was to Sri Lanka and, not surprisingly, the talk was titled "Venomous Vacation: KRZ Visits Sri Lanka." Kristen did most of the talking with Jim occasionally adding comments.

Kristen Wiley and Jim Harrison. Photograph by Dick Buchholz.

The title slide showed the logo of Animal Venom Research International (AVRI) with a cobra coiled near the sign. At the request of that organization Jim and Kristen traveled to Sri Lanka to aid in setting up a venom research center. With over a thousand a year, Sri Lanka has the highest incident of snakebite deaths per capita in the world. Many of those deaths can be attributed to having no antivenom specifically for Sri Lankan snakes. With the backing of the first lady of Sri Lanka, the Hon. Shiranthi Wickramasinghe Rajapaksa (to whom Jim and Kristen were introduced—Jim said that was the most nervous part of the trip for him). AVRI constructed a serpentarium in that country and invited Jim and Kristen to demonstrate some of their successful husbandry and extraction processes to the staff. We saw slides of the building's exterior and interior, a small but very clean and efficient building staffed by a capable and enthusiastic staff. Kristen mentioned that they wanted to avoid coming across as know-it-all Americans and looked at this as an opportunity to learn as much as they taught. As she recounted the responsibilities of four serpentarium staff members in a group photo you could tell that there was respect and affection for each.

A slide of *Hypnale hypnale* (hump-nosed pit viper) introduced the target snakes for which a serum will be developed. It's just one species of the endemic genus *Hypnale* in Sri Lanka, and the rust-colored head with its black, beige, and gray body began a parade of colorful venomous snakes. Cobras, *Naja naja*, on Sri Lanka are particularly attractive and actually have venom that is mostly hemotoxic, the opposite of mainland cobras. The gorgeous Russell's viper (*Daboia russelii*) on Sri Lanka is also a contrast to the mainland Russell's in that its venom is mostly neurotoxic. Death rates for the little *Echis carinatus* (saw-scaled viper) are difficult to track because they are mainly found in the north of the island where civil war has raged for years, making for difficult conditions under which to collect or do field research. Specimens of the common krait (*Bungarus caeruleus*) are hard to find because of their fossorial and nocturnal habits and difficult to milk because of their small fangs and low venom yield.

Those were the snakes on which the antivenom research would focus. Sri Lankan clinics used antivenom from India, but the differences in mainland and island snakes meant using many more vials of the mainland serum and possible lack of quality control meant that adverse reactions to the serum were in the 80

Jim thought the Sri Lankan cobras (*Naja naja*) were prettier than the mainland representives of this species. Photograph by Kristen Wiley.

Sri Lanka's Russell's vipers (*Daboia russelii*) have primarily neurotoxic venom unlike their mainland relatives. Photograph by Kristen Wiley.

One of the few habitats where Sri Lankans routinely kill snakes, a tea plantation. Photograph by Kristen Wiley.

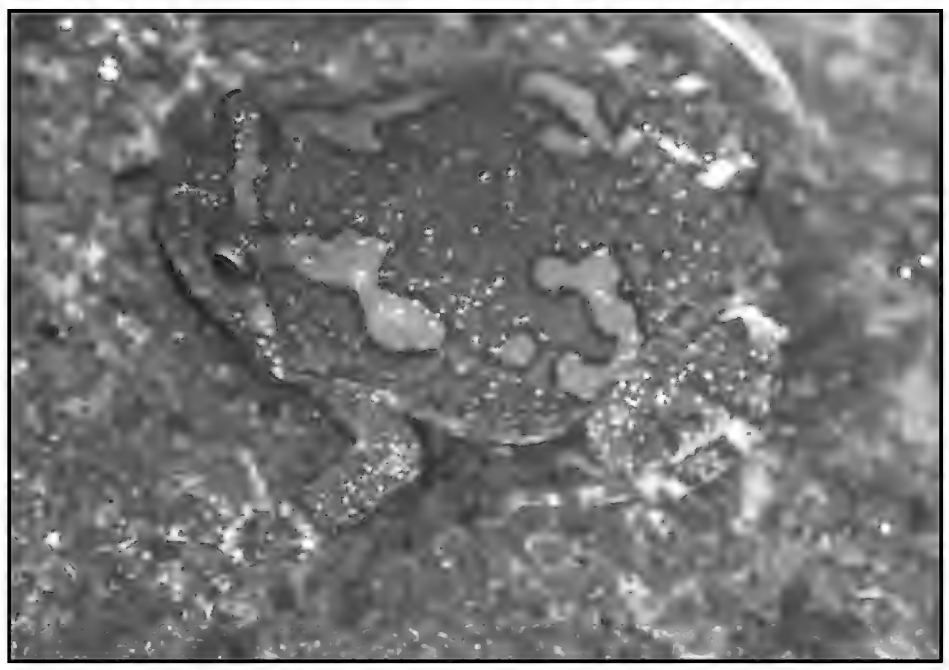
to 85% range or higher. Jim and Kristen would help the new serpentarium to develop an antivenom specific to the island by discussing restraint techniques, vet care, basics of hydration and feeding, and problems that may develop. They had slides of Jim demonstrating probing and a staff member tubing a cobra, a feat a little challenging when the cobra raises his hood. The couple had nothing but praise for the skill and confidence shown by the facility's primary handler. We saw Kristen showing dosing technique and treatment being given a Russell's viper that had been wounded by a machete. Amazingly enough, it recovered from the wound. Kristen pointed out that the average Sri Lankan does not automatically kill snakes, They are used to living in close vicinity to all wildlife, and in general will leave even venomous snakes alone. Indeed, officially, all wildlife is protected on Sri Lanka. The exception is the tea plantations where workers are paid a bounty for killing *Trimeresurus trigonocephalus*, the green Sri Lankan pitviper that is very difficult to see in the tea bushes. It accounts for a lot of bites but few deaths. We saw photos of Kristen and staff handling the little saw-scaled vipers and Jim milking cobras. The *Echis* are particularly difficult to milk not only because of their small size but also because their skin is so loose that they can rotate their bodies while you're gripping them. The most impressive milking photo for me was Jim milking a krait, which required slipping a very tiny glass capillary tube over the very small fangs of that very deadly snake.

The krait (*Bungarus caeruleus*) is hard to collect and difficult to milk. Photograph by Kristen Wiley.

While this was obviously a working vacation, Kristen and Jim did get a chance to tour some of Sri Lanka. Photos of Kristen holding a *Ptyas mucosa* allowed her to talk about the how Jim had to repeatedly shout, "snake!" as the other occupants of the car remained oblivious to the huge ratsnake by the side of the road. A picture of a grinning Kristen holding two species of flying snakes (*Chrysopelia ornata* and *C. taprobanica*) showed her pleasure in that experience. And there were

Kristen handling a large ratsnake (Ptyas mucosa). Photograph by Jim Harrison.

The smile shows that Kristen enjoyed holding two species of flying snake (*Chrysopelia* spp.). Photograph by Jim Harrison.



Sri Lankan painted frog (*Kaloula taprobanica*). Photograph by Kristen Wiley.

Vinesnake (*Ahaetulla nasuta*). Photograph by Kristen Wiley.

several pictures of Bengal monitors (*Varanus bengalensis*), as ubiquitous as squirrels according to Kristen. Photos of geckos and colorful skinks, impressive looking garden lizards (*Calotes versicolor*) and bright painted frogs (*Kaloula taprobanica*) kept our attention. We saw frogs and birds, ground squirrels and flocks of flying foxes. A snail as big as a hand caused definite audience reactions, not all favorable. A dramatic picture of a cool green vinesnake, *Ahaetulla nasuta*, was followed by a close-up of *Oligodon arnensis*, the nonvenomous banded kukri snake that Jim says can really slice skin when it bites.

They finished the presentation with more scenery and the shot of a family waving from the back of a flat bed truck, happily laughing and smiling as they took pictures of Kristen taking a picture of them. She commented on how most Sri Lankans were generally very gracious and welcoming.

So the first ever venom milked in Sri Lanka from Sri Lankan snakes was sent to the local university who agreed to freeze-dry it. It was then shipped to the Instituto Clodomiro Picado in Costa Rica, one of the premier antivenom producers in the world. There they are attempting to produce a single serum that will serve as an antidote for all of the major venomous snakes in Sri Lanka. This effort requires cooperation among several organizations around the world. It's not a short or easy process, but soon Sri Lanka's death rate from snakebites should begin dropping.

Jim and Kristen drove up from the Kentucky Reptile Zoo the day they gave the talk, and they left immediately after the meeting. Running their operation is an intense and demanding job, and we were lucky that they were willing to take the time to come to Chicago. They do frequent educational events near and far, give lectures and speak at seminars and conferences. It's worth your time to check out their website and their Facebook page as well as the Animal Venom Research International website. Kristen and Jim work hard and remain modest about their efforts. Those efforts contribute to health care advances and saving lives all over the world. As Jim says, that's what it's all about.

This nonvenomous kukri snake (*Oligodon arnensis*) has a wicked bite. Photograph by Kristen Wiley.

Herpetology 2014

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

A NEW SPECIES OF HORNED LIZARD

A. Nieto-Montes de Oca et al. [2014, Herpetologica 70(2):241-257] describe *Phrynosoma sherbrookei* from central northeastern Guerrero, México; perform a phylogenetic analysis of mitochondrial and nuclear sequence data to estimate its phylogenetic relationships; and investigate the monophyly of *Phrynosoma asio*, *P. braconnieri* and *P. taurus*. *Phrynosoma sherbrookei* can be distinguished from all of its congeners by a unique combination of morphological characteristics. The molecular data include three fragments of the mitochondrial genome and six nuclear genes for 31 samples belonging to the 16 previously recognized species of *Phrynosoma* and the new species. The new species is strongly supported in maximum likelihood analyses of both the concatenated mitochondrial and nuclear data as a monophyletic, distinct evolutionary lineage sister to, and moderately divergent from, *P. taurus*, and highly divergent from all of the other species of *Phrynosoma*. A Bayesian species tree analysis also strongly supports monophyly of the Brevicauda clade, and a sister relationship between *P. taurus* and the new species.

INFLUENCE OF SHADE ON EGG PREDATION

N. E. Karraker [2013, Herpetologica 69(3):257-264] notes that abiotic factors have been demonstrated to mediate predator–prey interactions in aquatic and terrestrial communities. For amphibians changes in pH, pollutants, temperature, ultraviolet-B, and moisture levels can alter behavioral, developmental, and physiological aspects of predator–prey relationships resulting in reduced survivorship. Some rhacophorid frogs deposit eggs as foam nests on vegetation overhanging water, presumably as an adaptive response to the risk of egg predation by aquatic animals. Terrestrial insects are known to feed on frog embryos in foam nests, and anecdotal observations in tropical Asia suggested that predation of frog embryos by dipteran fly larvae may be higher in unshaded areas. To understand the role that shading may play, the author compared survival of embryos of the brown treefrog (*Polypedates megacephalus*) infested by larvae of a calliphorid fly (*Phumosia coomani*) in shaded and unshaded conditions in a controlled field study. When foam nests were infested by flies, survival to hatching was more than 15 times higher in shaded than in unshaded nests. Less than 1% of frog embryos survived to hatching in unshaded, infested foam nests which contained twice as many fly larvae as shaded nests. These results suggest that both colonization and predation by flies are higher in unshaded foam nests. The mechanism triggering increased colonization of unshaded nests is unclear, but warmer temperatures on the surfaces of unshaded foam nests may decrease hatching time for fly eggs, permitting fly larvae to move inside the foam nest more quickly and begin feeding on amphibian embryos. Although the risk of predation by calliphorid flies is higher for *P. megacephalus* in unshaded areas, the benefits of developing in warmer conditions, including faster embryonic and larval development and larger size at metamorphosis, may offset this risk.

FROG POPULATIONS IN IRELAND

N. Reid et al. [2014, J. Herpetology 48(1):13-19] note that ponds are an ephemeral feature of the landscape but their large-scale loss can have profound implications for biodiversity and the persistence of amphibian populations. The authors quantified rates of pond loss throughout Ireland over a period of approximately 125 yr. Environmental parameters and perceived risk factors associated with the current occurrence and density of the common frog, *Rana temporaria*, were also analyzed. The numbers of farmland ponds declined by 54% between 1887 and 1913 and 2005–11, with most ponds and the greatest losses in the East, coincident with agricultural intensification and human habitation. The decline of pond numbers was significant but, at approximately 0.5% per annum, was substantially less than losses recorded in other European countries. Losses were coincident with major changes to the agricultural landscape including extensive land drainage. However, losses of pond and natural wetland habitats throughout Ireland may have been partially or wholly mitigated by a synchronous expansion of artificial field margin ditches associated with drainage projects during the mid-20th century. The ecology of the common frog in Ireland was similar to its ecology elsewhere and it appears largely unaffected by pollution and disturbance. Consequently, the conservation status of the frog in Ireland was judged "favorable" and should remain so for the foreseeable future.

SOUND COMMUNICATION IN A RIVER TURTLE

C. R. Ferrara et al. [2014, Herpetologica 70(2):149-156] note that the social behavior of turtles during the nesting season can be attributed to a series of functions such as reducing predation, increasing hatchling survivorship, and information exchange between nesting females. However, the mechanism(s) used to remain in a group during the different phases of nesting behavior has yet to be explained. The objective of this study was to document the sounds produced by giant South American river turtles, *Podocnemis expansa*, during the nesting period, and identify how acoustic mechanisms might facilitate social behavior and group aggregation during this period. From September 2009 to October 2011, the sound repertoire of *P. expansa* was recorded during the nesting period, which begins with the migration of the turtles from the flooded forests to the nesting beaches and terminates when the hatchlings emerge and the females migrate with the hatchlings to the flooded forests. Sounds were recorded when the turtles were active in different behavioral patterns (1) migrating; (2) aggregating in front of the nesting beaches before basking; (3) nesting at night; (4) waiting in the water without nesting or after they have nested; and (5) waiting for the arrival of the hatchlings. Six types of sound were observed in the recordings of turtles made during the nesting period. These data indicate that this species is social, and that sound plays an important role in the synchronization of the activities of groups during the nesting season.

EFFECTS OF AN INVASIVE PLANT METABOLITE

A. B. Sacerdote and R. B. King [2014, J. Herpetology 48(1):51-58] demonstrate novel direct effects of an invasive plant metabolite on embryo development in the native western chorus frog (*Pseudacris triseriata*) and a model organism, African clawed frog (*Xenopus laevis*). European buckthorn (*Rhamnus cathartica*) exhibits aggressive growth in amphibian breeding sites and releases the secondary metabolite, emodin, into soil and water. Emodin is known to have several deleterious, bioactive properties in mammals and birds, but its effects on amphibians have not been assessed. The authors used the FETAX (Frog Embryo Teratogenesis Assay–*Xenopus*) protocol to assess the effect of emodin on amphibian development in *X. laevis*, and modified the assay with *P. triseriata* to determine whether effects were consistent in a native species occurring within the range of the invasive *R. cathartica*. They detected and quantified emodin at amphibian breeding ponds that were infested heavily with buckthorn and have experienced recent declines in amphibian diversity and abundance. The *X. laevis* assay demonstrated significant embryo mortality and malformation in the presence of a gradient of concentrations of emodin including those detected in the environment. Teratogenicity indices (TI) > 2 indicate the strong development-disrupting potential of emodin in amphibians. The *P. triseriata* assay produced embryo mortality and malformation similar to the *X. laevis* assay. However, *P. triseriata* were more sensitive to emodin than *X. laevis*, with TIs > 40. Such effects may contribute to amphibian declines through depressed hatching success and poor larval survival and may represent an unrecognized impact of invasive plants more generally.

RANAVIRUS INFECTIONS AMONG SYMPATRIC HERPS

A. F. Currylow et al. [2014, J. Herpetology 48(1):117-121] note that ranaviruses are emerging as serious pathogens across ectothermic taxa, recently causing mass die-offs including entire chelonian populations. Amphibians may serve as reservoirs for chelonian infections. To assess this idea and determine whether chelonians in the Midwest are infected with (or at risk for) ranavirus infections, they tested for presence of ranavirus infections among sympatric larval amphibians ($N = 135$) and eastern box turtles (*Terrapene carolina carolina*, $N = 132$) earlier and later in the box turtle active season (between May and October 2009) in south-central Indiana. Three larval amphibians (2.2%; one *Ambystoma* sp. and two unidentifiable anuran larvae) and four box turtles (3.0%) tested positive for a ranavirus. Ranavirus infections were found in both early-season pond breeders (anurans) and then later-season pond breeders (salamanders), spanning the box turtle active period, but mass die-offs were not detected. The majority (75%) of the ranavirus-positive box turtles were found later in the season. This represents the first documented case of ranavirus infection among a box turtle population in the Midwest and one of the few studies reporting ranaviruses across wild sympatric taxa. These results suggest that ranaviruses persist sublethally in both larval amphibians and individual box turtles, allowing them to serve as reservoirs for this disease. Future studies should include sampling of all sympatric herpetofauna and investigate prevalence and persistence of the virus to understand better the risks of cross-contamination.

GREEN TURTLES ALONG THE TEXAS COAST

T. L. Metz and A. M. Landry, Jr., [2013, Chelonian Conservation and Biology 12(2):293-302] note that the in-water status of green turtles (*Chelonia mydas*) in the northwestern Gulf of Mexico has received comparatively little attention in the management and conservation of this species in US waters. The authors addressed this void via entanglement netting surveys at 3 estuarine areas (Lavaca-Matagorda Bay, the Aransas Bay complex, and the lower Laguna Madre [LLM]) to assess trends in the relative abundance, distribution, and size composition of green turtles in Texas inshore waters during 1991–2010. Overall catch per unit effort (CPUE) in the LLM (1.5 turtles/km-hr) was significantly higher than that observed in the other 2 estuaries and corresponded to general climate patterns and seagrass areal coverage along the Texas coast. Yearly CPUE of green turtles from the LLM exhibited a significant exponential increase from 1991 to 2010, despite variability in capture rate during recent years. Mean straight carapace length (SCL) of green turtles was statistically similar across the 3 study areas and indicative of dominance by juvenile individuals (LLM mean = 42.2 cm SCL). Historical green turtle size data in the LLM also reveal an overall decreasing trend in mean SCL and shift toward an increased percentage of smaller individuals (30–39.9- and 40–49.9-cm SCL size classes). Also, sighting frequency of postpelagic green turtles at the Brazos-Santiago Pass jetties within the LLM during 2009 was roughly 9 times that reported for comparable months during 1992–1993. These results are indicative of enhanced recruitment of neritic green turtles to the northwestern Gulf of Mexico, most likely due to elevated nesting productivity at beaches in Mexico, Florida, the Caribbean, and the western Atlantic. Overall, the lower Texas coast serves as an important developmental foraging habitat for an increasing population of juvenile green turtles in the northwestern Gulf of Mexico.

PATTERNS OF ULTRAVIOLET LIGHT EXPOSURE

G. W. Ferguson et al. [2014, Herpetologica 70(1):56-68] monitored ultraviolet-B (UVB) irradiance exposure (measured using the ultraviolet index [UVI]) of the western sagebrush lizard (*Sceloporus graciosus gracilis*) in Lassen Volcanic National Park, California, and the related dunes sagebrush lizard (*S. arenicolus*) in eastern New Mexico. For *S. graciosus gracilis*, on sunny days between 0900 and 1100 h, average lizard UVI tracked available solar UVI. Periodic shade-seeking between 1100 and 1600 h resulted in lizard UVI being less than the available solar UVI. This daily pattern of exposure was evident for the activity period from June until August. This general pattern was also evident for *S. arenicolus* except when air temperatures exceeded 37°C; at these times, all *S. arenicolus* subjects retreated underground for much of the afternoon. Individuals of *S. graciosus* gracilis exhibited large within-day variations in the durations of time that they basked in full sun, sought shade, and retreated underground. Two lizards followed for most of a day showed very different patterns of UVI exposure, yet the calculated daily UVB dose (irradiance × time) was similar for both individuals. Some, but not all, *S. graciosus gracilis* periodically retreated underground during their daily activity; retreat was more frequent and UVI exposure more intense on a cooler day at the California study site.

Unofficial Minutes of the CHS Board Meeting, May 16, 2014

President John Archer called the meeting to order at 7:45 P.M. Board members Jason Hood, Aaron LaForge, Erica Mede and Jenny Vollman were absent. Linda Manchen Malawy agreed to take the minutes of this month's meeting.

Officers' Reports

Recording Secretary: In the absence of the recording secretary, John Archer read the minutes of the April 18 board meeting. Corrections were made and the minutes accepted.

Treasurer: Andy Malawy presented the treasurer's report.

Membership Secretary: Mike Dloogatch commented on the recent purchase of 2500 #10 window and 2500 #9 return envelopes for which the CHS will be invoiced. The list of recently lapsed memberships was shared.

Sergeant-at-arms: Dick Buchholz reported the number in attendance at the April general meeting was 46.

Committee Reports

Shows: John Archer opened a discussion regarding the position of show coordinators. We are in need of individuals who are interested in organizing educational shows—arrangements with the venue, procuring members to work the shows, and attending to basic details.

If interested in attending any upcoming events, please contact Dick Buchholz.

- Notebaert Nature Museum, first full weekend of each month.
- Rockin' for the Reptiles, Midwest Museum of Natural History, Sycamore, Illinois, Saturday, June 28, 12–5 P.M.
- Bug Fest, Red Oak Nature Center, Batavia, Illinois, August 23.
- Unity Fest, Marquette Park, Chicago, September 6.
- Westmont Pet Promenade, September 13.

Adoptions: Red-eared sliders continue to be the daily request for placement. Designing a link specifically for this purpose was mentioned as a possibility. Junior Herpers: Erica Mede's program at the May meeting was on "Reptiles of Star Wars." Rich Lamszus commented that attendance was again around 60 people. Junior Herpers has proven to be a big hit.

Library: Teresa Savino is trying to eliminate outdated materials. Mike Dloogatch will assist.

Old business

Herp of the month: Any herp in an educational setting.

Website link: Erica gave a report on the Friends of Scales reptile rescue. After discussion, a link to Friends of Scales will be placed on the CHS website.

New Illinois herp laws: Senate Bill 902 has passed from committee and is now into the full house. There is a website for following the bill and for locating your own representative: http://openstates.org/il/bills/98th/SB902/. The board of the Chicago Herpetological Society favors passage of this bill.

Notebaert Cage: John Archer and Jason Hood met with representatives of the Peggy Notebaert Nature Museum to consider design elements for the Marsh Exhibit, which is to be an enclosure for displaying salamanders. This is in the preliminary stages.

New Business

Podcasts: Linda inquired about logistics for podcasts for Jr. Herp or General Meeting speaker presentations. Short discussion followed.

Looking ahead: John Archer asked the board to think about ways to improve participation by local members in CHS events and meetings. As examples of options that might be considered he mentioned fewer board meetings, decreased number of board members, or a new venue for meetings. He also asked everyone to think about a chair for the nominating committee, which must be formed soon to slate the 2015 board of directors. All members are invited to attend board meetings, see the society at work and determine if involvement on the board might be a consideration.

Round Table

Dick Buchholz is leaving for Kentucky next weekend with Mike Scott. Looking forward to warm weather and some good hiking.

Mike Dloogatch reported on a CHS grant recipient working on box turtles in the region, and the possibility of a field trip with her in the future.

Mike Scott found a baby water snake in Pacos Hills over the weekend. Sign of warm weather!

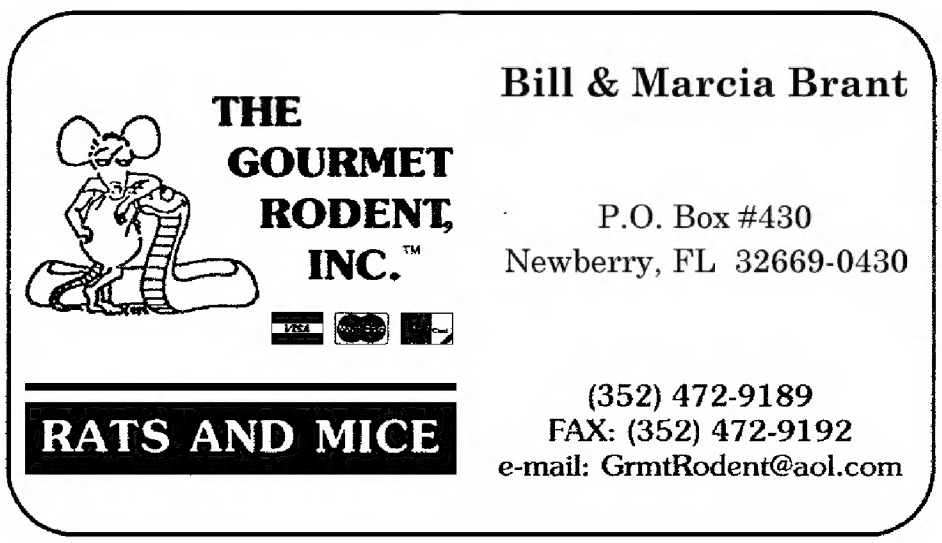
Rich Lamszus reported the Jr Herpers will be visiting behind the scenes at Lincoln Park Zoo June 8.

Teresa Savino wants warm weather to plant her vegetable garden, and husband Roy Carlson shared the hockey score.

Linda Malawy shared the news that a long time member, Ben Entwisle succumbed to cancer on May 10, 2014. He will be missed.

The meeting was adjourned at 9:44 P.M.

Respectfully submitted by Linda Manchen Malawy for the recording secretary



Advertisements

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, PO Box 430, Newberry, FL 32669-0430, 352-472-9189, E-mail: GrmtRodent@aol.com.

For sale: **highest quality frozen rodents**. I have been raising rodents for over 30 years and can supply you with the highest quality mice available in the U.S. These are always exceptionally clean and healthy with no urine odor or mixed in bedding. I feed these to my own reptile collection exclusively and so make sure they are the best available. All rodents are produced from my personal breeding colony and are fed exceptional high protein, low fat rodent diets; no dog food is ever used. Additionally, all mice are flash frozen and are separate in the bag, not frozen together. I also have ultra low shipping prices to most areas of the U.S. and can beat others shipping prices considerably. I specialize in the smaller mice sizes and currently have the following four sizes available: Small pink mice (1 day old—1 gm) , $25 /100; Large pink mice (4 to 5 days old—2 to 3 gm), $27.50 /100; Small fuzzy mice (7 to 8 days old—5 to 6 gm) , $30/100; Large fuzzy mice / hoppers (10 to 12 days old—8 to 10 gm), $35/100 Contact Kelly Haller at 785-234-3358 or by e-mail at kelhal56@hotmail.com

For sale: High quality, all locally captive-hatched tortoises, all bred and hatched here in the upper Midwest. Baby leopards, Sri Lankan stars, and pancakes usually available, and are all well-started and feeding great! Leopards are $125 ea., Sri Lankans (2012 hatched) $475 ea. And Pancakes are $195 ea. Leopards for out of state sale/shipping require a veterinary health certificate (inquire for cost). E-mail at KKranz1@wi.rr.com or call Jim or Kirsten at 262 654 6303.

Herp tours: **Costa Rica herping adventures**. Join a small group of fellow herpers for 7 herp-filled days. We find all types of herps, mammals, birds and insects, but our target is snakes. We average 52 per trip, and this is our 10th year doing it. If you would like to enjoy finding herps in the wild and sleep in a bed at night with air-conditioning, hot water and only unpack your suitcase once, instead of daily, then this is the place to do it. Go to our web-site http://hiss-n-things.com and read the highlights of our trips. Read the statistics of each trip and visit the link showing photos of the 40 different species we have found along the way. E-mail at jim.kavney@gmail.com or call Jim Kavney, 305-664-2881.

Line ads in this publication are run free for CHS members—$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, June 25, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. This will be our popular and always well-attended annual **Show & Tell** meeting. Bring an animal that you find interesting for one reason or another and be prepared to give a short (under five minutes) presentation to the group. Don't be shy. Neither age (yours) nor commonness (the animal's) should be a limitation.

A speaker has not yet been confirmed for the July 30 meeting.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

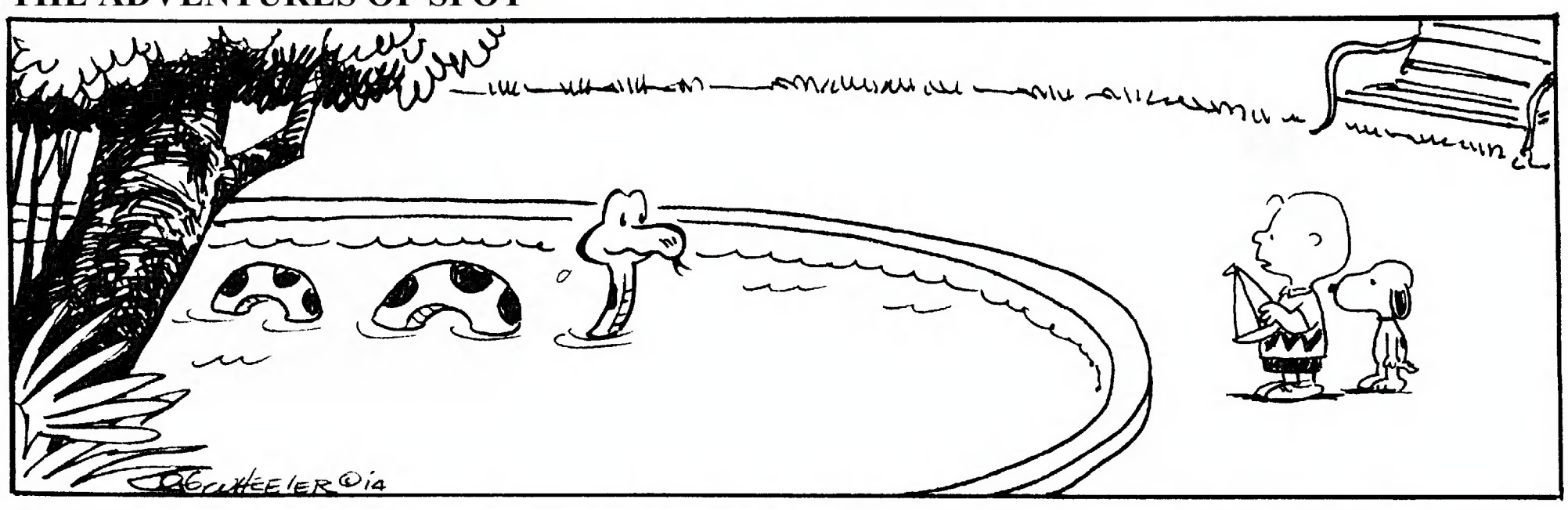
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., July 18, at the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg..

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

THE ADVENTURES OF SPOT



Periodicals Postage
Paid at Chicago IL

CHICAGO HERPETOLOGICAL SOCIETY

Affiliated with the Chicago Academy of Sciences

2430 North Cannon Drive • Chicago, Illinois 60614